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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,475	04/06/2005	Masahide Kawaraya	050179	4981

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EXAMINER	
RODGERS, COLLEEN E	
ART UNIT	PAPER NUMBER
2813	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/530,475	KAWARAYA ET AL.	
	Examiner	Art Unit	
	Colleen E. Rodgers	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/5/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action responds to the Amendment filed 12 July 2006. No claims are amended.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4-9 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Akui et al** (US Patent Application Publication 2002/0042343).

Regarding claim 1, **Akui et al** disclose a process for forming a semiconductor film, comprising the steps of:

applying a semiconductor particle dispersion liquid to a substrate surface [see paragraphs 0009, 0021] by spray coating [see paragraph 0047]; and

drying the coating to form a porous semiconductor film [see paragraph 0038].

Akui et al are silent as to the mean diameter of the atomized droplets of the dispersion liquid. However, these claims are *prima facie* obvious without a showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937

(Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art in general conditions is obvious).

In this case, there exists no evidence of record that the droplet size provides unexpected results in the layer of semiconductor particle dispersion liquid produced. One of ordinary skill in the art would be motivated to optimize the drop size to provide for processing limitations, such as the equipment used and the physical properties of the dispersion liquid (i.e. particle size, liquid viscosity, etc.).

Regarding claim 4, **Akui et al** disclose the process according to claim 1, wherein the semiconductor particle dispersion liquid is a dispersion in methanol or ethanol [see paragraph 0037, wherein an alcohol solvent is mentioned, and paragraph 0033, where methanol and ethanol are specified] of particles of a semiconductor, specifically a metal oxide [see paragraph 0037].

Regarding claim 5, **Akui et al** disclose the process according to claim 4, wherein the semiconductor particles are titanium oxide particles [see paragraph 0037].

Regarding claim 6, **Akui et al** disclose the process according to claim 5, wherein the titanium oxide particles are anatase-type titanium oxide particles [see paragraph 0037].

Regarding claims 7-9, **Akui et al** disclose the process according to claim 1. **Akui et al** are silent as to the solids content of the semiconductor particle dispersion liquid, the viscosity of the dispersion liquid and the mean diameter of the atomized droplets. However, these claims are *prima facie* obvious without a showing that the claimed ranges achieve unexpected results relative to the

prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art in general conditions is obvious).

In this case, there exists no evidence of record that the solids content of the semiconductor particle dispersion liquid, the viscosity of the dispersion liquid or the mean diameter of the atomized droplets provide unexpected results in the layer of semiconductor particle dispersion liquid produced. One of ordinary skill in the art would be motivated to optimize the solids content of the semiconductor particle dispersion liquid, the viscosity of the dispersion liquid and the mean diameter of the atomized droplets to provide for processing limitations and the desired semiconductor film.

Regarding claims 12-14, **Akui et al** disclose the process according to claim 1. The photocatalyst formed thereby is a product of the process, and is therefore considered to be anticipated by the cited art. See MPEP 2112.02.

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Akui et al** (US Patent Application Publication 2002/0042342) as applied to claims 1, 4-9 and 12-14 above, and further in view of **Arakawa et al** (USPN 6,228,796). **Akui et al** teach the process according to claim 1 as described above. **Akui et al** do not disclose wherein the substrate is a thermoplastic resin substrate. **Arakawa et al** disclose a substrate formed of a thermoplastic resin, specifically a high polymer film [see col. 3, line 6-65]. It would have been obvious to one of ordinary skill in the art at

the time of invention to incorporate the polymer substrate of **Arakawa et al** into the method taught by **Akui et al** because **Arakawa et al** teach that thermoplastic resin is a preferred material not only due to its high performance as in insulator, withstanding temperatures up to 400°C, but also because it is lightweight and easy to shape [see col. 3, lines 8-15].

6. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Akui et al** (US Patent Application Publication 2002/0042342) as applied to claims 1, 4-9 and 12-14 above, and further in view of **Kawazu et al** (US Patent Application Publication 2002/0186469). **Akui et al** further disclose wherein the coating is dried by heating at a temperature of about 200°C or lower [see paragraph 0038]. **Akui et al** fail to disclose wherein the coating is dried by irradiation electromagnetic waves, specifically microwave irradiation. **Kawazu et al** disclose drying a coating with irradiation with electromagnetic waves [see paragraph 0014]. It would have been obvious to one of ordinary skill in the art at the time of invention to use the drying method of **Kawazu et al** in the process of **Akui et al** because the method beneficially promotes polarization in the film by completely depositing particles [see paragraph 0019].

7. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Muramatsu et al** (US Patent Application Publication 2002/0002112) in view of **Akui et al** (US Patent Application Publication 2002/0042342).

Regarding claim 15, **Muramatsu et al** disclose a photoelectrode comprising a porous semiconductor film [see paragraph 0008] on an electrically conductive transparent layer [see paragraph 0039] formed on a glass layer [see paragraph 0085]. **Muramatsu et al** do not disclose wherein the porous semiconductor film is formed by the method of claim 1, as taught by **Akui et al**

as explained above. It would have been obvious to one of ordinary skill in the art at the time of invention to form the film of **Muramatsu et al** by the method of **Akui et al** because **Akui et al** teach that their method forms a film that has good adhesion and is difficult to peel off [see **Akui et al**, paragraph 0025].

Regarding claims 16 and 17, the prior art of **Muramatsu et al** and **Akui et al** disclose the photoelectrode according to claim 15. Furthermore, **Akui et al** disclose wherein the semiconductor particles are titanium oxide particles [see paragraph 0037], specifically anatase-type titanium oxide particles [see paragraph 0037].

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colleen E. Rodgers whose telephone number is (571) 272-8603. The examiner can normally be reached on Monday through Friday, 9:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CER

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